

Math Achievement Rubric for 8th Grade Knollwood Report Card

12/1/2010 2:02 PM

<p>Number Concepts and Computation: Understands uses / representations of numbers</p>	<p>3</p> <ul style="list-style-type: none">• Names the fractional part of a whole when the parts are varying sizes using a fraction, decimal, and percent• Expresses remainders as fractions or decimals rounded to the designated place, depending upon the situation• Lists the prime factorization of a number using exponents• Uses factors, multiples, prime factorization, and relatively prime numbers to solve problems in an efficient manner• Consistently understands and uses integers, ratios, and proportions to represent quantitative relationships• Converts between fractions, decimals (including repeating decimals), and percents with automaticity• Solves multi-step problems involving percents and explains strategies used• Uses exponents to represent repeated multiplication• Demonstrates facility with representing large and small numbers in exponential, scientific, and calculator notation• Explains pi as the ratio of the circumference of a circle to its diameter
---	--

	<p>2</p> <ul style="list-style-type: none"> Names the fractional part when parts are different sizes using a fraction, decimal or percent with an example or teacher prompting Expresses remainders as a fraction or decimal Lists the prime factorization of a number Uses factors, multiples, prime factorization, and relatively prime numbers to solve problems, with partial success Understands and uses integers, ratios, and proportions to represent quantitative relationships Converts between fractions, decimals (including repeating decimals), and percents with partial success Solves single step and some multi-step problems involving percents using proportion or decimals Recognizes appropriate situations for the use of pi
	<p>1</p> <ul style="list-style-type: none"> Names the fractional part of a whole when the parts are uniform in size Attempts to use a factor tree to find the prime factorization of a number Uses ratios and proportion to represent quantitative relationships when given a model Renames common fractions (i.e. halves, thirds, fourths, fifths, tenths, twentieths, and hundredths) as decimals and percents Attempts to solve single-step problems involving percent using proportion Can substitute 3.14 for pi in a given formula
	<p>E</p> <ul style="list-style-type: none"> Understands the concept of negative exponents Converts between fractions, decimals (including repeating decimals) and percents easily to set up and solve complex word problems

<p>Number Concepts and Computation: Computes accurately</p>	<p>3</p> <ul style="list-style-type: none"> • Consistently selects appropriate methods and is fluent in their use for computing with fractions, decimals, integers and percents from among mental arithmetic, paper-and-pencil algorithms, calculators, and estimation, depending upon the situation and applies method to find the correct result • Uses order of operations correctly and appropriately to evaluate an expression • Sets up and solves proportions using either rate or cross-products methods and explains reasoning • Consistently computes with positive and negative exponents on whole number bases • Computes percent of increase/decrease
	<p>2</p> <ul style="list-style-type: none"> • Uses mental arithmetic, paper-and-pencil algorithms, and calculators to operate on whole numbers, fractions and decimals, and signed numbers with partial accuracy • Applies standard algorithms for computing with fractions, decimals, and integers • Understands that there is an order of operations • Solves proportions using cross-products or unit rate method, with partial accuracy • Computes with positive and negative exponents on whole number bases with partial success • Computes percent of increase/decrease with partial success • Fact knowledge may impede speed and accuracy

	<p>1</p> <ul style="list-style-type: none"> • Attempts to use strategies to operate on whole numbers, fractions, decimals, and signed numbers • Operates from left to right • Solves given proportions using cross products with partial accuracy • Computes percent of increase/decrease with model or teacher prompting • Fact knowledge often impedes speed and accuracy
	<p>E</p> <ul style="list-style-type: none"> • Performs calculations on all rational numbers and can explain the underlying principles, including square root • Explains order of operations used in solving complex word problems • Solves complex percent problems • Computes with a strong intuitive number sense

<p>Geometry, Measurement and Data:</p> <p>Understands and applies geometric concepts</p>	<p>3</p> <ul style="list-style-type: none"> • Correctly applies formula to find perimeter of irregular figures • Correctly applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) and explains strategy • Correctly applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures (prisms, pyramids, cylinders, cones) and explains strategy • Easily comprehends 2-dimensional drawings of 3-dimensional figures • Works backward to find a dimension of a shape given its perimeter, circumference, area or volume • Finds dimensions of similar figure given a scale factor (enlargement or reduction) • Calculates the scale factor used to enlarge/reduce a polygon • Correctly identifies and applies the Pythagorean theorem • Identifies, describes, and sketches (including plotting on the coordinate plane) instances of reflections, translations, and rotations • Consistently uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate plane and on the x and y axes • Consistently identifies the x and y axes
--	---

	<p style="text-align: center;">2</p> <ul style="list-style-type: none"> • Describes and uses strategies to find the perimeter of polygons • Applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) with partial success • Applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures with partial success (prisms, pyramids, cylinders, cones) • Comprehends 2-dimensional drawings of 3-dimensional figures when given a model or teacher prompting • Works backward to find a missing dimension of a shape given its perimeter, circumference, or area (triangles and rectangles) • Calculates missing sides on similar figures when given a scale factor • Correctly identifies the Pythagorean theorem • Identifies, describes and sketches examples of reflections, translations, and rotations using tracing paper • Uses ordered pairs of numbers to name, locate, and plot points in all four quadrants of a coordinate plane and on x and y axes with prompting
	<p style="text-align: center;">1</p> <ul style="list-style-type: none"> • Uses strategies to find the area of circle, triangle, rectangle, parallelogram, and trapezoid • Uses strategies to find the surface area and volume of rectangular prisms • Using a formula, calculates the volume of a rectangular prism • Works backward to find a missing dimension of a shape given its perimeter • Calculates missing sides on similar figures using a proportion • Enlarges/reduces a polygon given a whole number scale factor • Knows that the Pythagorean theorem applies to triangles • Identifies, describes, and sketches examples of translations • Uses ordered pairs of numbers to name, locate, and plot points in the first quadrant

	<p>E</p> <ul style="list-style-type: none"> • Solves multi-step problems involving perimeter, area, and volume with other mathematical concepts (ex: Given the dimensions of a cereal box, find dimensions of new box that will have a volume that is 50% larger than the original.) • Uses the Pythagorean theorem in real-world situations to identify the missing side of a right triangle • Solves for perimeter and area or missing dimension using variable expressions • Describes rules for the way coordinates of the vertices will change or not change after flip, turn, or slide
--	--

<p>Geometry, Measurement and Data: Analyzes / interprets / graphically represents data</p>	<p>3</p> <ul style="list-style-type: none"> • Consistently collects and organizes data or uses given data to accurately graph data in a table, histogram, stem-and-leaf plot, box plot, and scatter plot, with reasonable titles, intervals, labels and keys • Chooses and creates appropriate type of graph to represent a situation • Creates graph on the graphing calculator with printed instructions • Finds and uses the minimum, maximum, mode, mean, median, range, and inter-quartile range and graphs to ask and answer questions, draw conclusions, and make predictions • Recognizes the effect of outliers on median and mean • Can create data set when given some statistical landmarks • Make conjectures about the relationship shown in a scatter plot
--	--

	<p>2</p> <ul style="list-style-type: none"> • Can collect and organize data or use given data to create a table, histogram, stem-and-leaf plot, box plot, or scatter plot with reasonable titles, intervals, labels, and keys • Collects data but the graph may not give us a clear picture of it • Creates graph on the graphing calculator with teacher support • Finds and uses the minimum, maximum, mode, mean, median, range, and inter-quartile range and graphs to ask and answer questions • Can visually recognize outliers in a set of data or graph • Attempts to create data set when given some statistical landmarks
	<p>1</p> <ul style="list-style-type: none"> • Uses given data to create table, histogram, stem-and-leaf plot, box plot, and scatter plot • Recognizes appropriate type of graph to represent a situation • Finds and uses the minimum, maximum, mode, mean, median, range, and inter-quartile range and graphs to ask and answer questions • Can visually recognize outliers in a set of data or graph • Attempts to create data set when given some statistical landmarks
	<p>E</p> <ul style="list-style-type: none"> • Creates graph on the graphing calculator independently • Recognizes and explains in detail how an outlier will affect a data set

<p>Geometry, Measurement and Data: Uses appropriate strategies /formulas to measure</p>	<p>3</p> <ul style="list-style-type: none"> • If given an irregular shape, can find the length of a side, including curved sides, when given enough information • Correctly applies formula to find perimeter of irregular figures • Correctly applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) and explains strategy • Correctly applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures (prisms, pyramids, cylinders, cones) and explains strategy • Easily comprehends 2-dimensional drawings of 3-dimensional figures • Works backward to find a dimension of a shape given its perimeter, circumference, area or volume • Finds dimensions of similar figure given a scale factor (enlargement or reduction) • Calculates the scale factor used to enlarge/reduce a polygon
	<p>2</p> <ul style="list-style-type: none"> • If given an irregular shape, can find the length of straight sides when given enough information • Describes and uses strategies to find the perimeter of polygons • Applies formulas to find area of 2-dimensional shapes, including shapes that are combinations of simple shapes (circle, triangle, rectangle, parallelogram, trapezoid) with partial success • Applies formulas to find surface area and volume of 3-dimensional figures, including figures that are combinations of simple figures with partial success (prisms, pyramids, cylinders, cones) • Comprehends 2-dimensional drawings of 3-dimensional figures when given a model or teacher prompting • Works backward to find a missing dimension of a shape given its perimeter, circumference, or area (triangles and rectangles) • Calculates missing sides on similar figures when given a scale factor

	<p>1</p> <ul style="list-style-type: none"> • If given an irregular shape, can find the length of straight sides when given enough information with partial success • Uses strategies to find the area of circle, triangle, rectangle, parallelogram, and trapezoid • Uses strategies to find the surface area and volume of rectangular prisms • Using a formula, calculates the volume of a rectangular prism • Works backward to find a missing dimension of a shape given its perimeter • Calculates missing sides on similar figures using a proportion • Enlarges/reduces a polygon given a whole number scale factor
	<p>E</p> <ul style="list-style-type: none"> • Solves multi-step problems involving perimeter, area, and volume with other mathematical concepts (ex: Given the dimensions of a cereal box, find dimensions of new box that will have a volume that is 50% larger than the original.) • Uses the Pythagorean theorem to find the missing side of a right triangle <p>Solves for perimeter and area or missing dimension using variable expressions</p>
<p>Patterns and Algebra: Understands / represents relations and functions</p>	<p>3</p> <ul style="list-style-type: none"> • Represents relationships using words, algebraic notation, tables and graphs • Translates from one representation to another and uses representations to solve problems • Uses several properties of linear functions to explain a graph of the function • Describes differences between graphs of relations in order to explain the relations • Uses knowledge of intercepts to identify graphs

	<p>2</p> <ul style="list-style-type: none"> Writes rules for relationships involving the four basic arithmetic operations Represents simple relationships using words, symbols, tables and graphs and uses those representations to solve problems Chooses appropriate representations for relations but struggles with the language to explain to make generalizations about them
	<p>1</p> <ul style="list-style-type: none"> Uses words and symbols to describe and write rules for relationships that involve one of the basic arithmetic operations Interprets graphs by using points but not in a global sense Neglects connecting the representation back to the original problem context
	<p>E</p> <ul style="list-style-type: none"> Moves from a specific solution to make generalizations about types of solutions Makes connections between different algebraic representations: graphs, equations, verbal rules, and tables Understands how an equation determines the shape of the graph
Patterns and Algebra: Recognizes, describes, extends, and/or creates patterns	<p>3</p> <ul style="list-style-type: none"> Describes rules for patterns and uses them to solve patterns Represents patterns and rules using algebraic notation Draws and extends a visual pattern Uses a table to extend a pattern Expresses an even or odd number algebraically Notices relationships and number patterns, such as perfect squares Writes an expression to give the nth term in a sequence
	<p>2</p> <ul style="list-style-type: none"> Uses a given rule for patterns and uses them to solve problems Recognizes squares and square numbers Draws the next step in a visual pattern

	<p>1</p> <ul style="list-style-type: none"> • Recognizes vertical patterns in tables • Sees differences from one stage in a visual pattern to the next but may not be able to create the next stage
	<p>E</p> <ul style="list-style-type: none"> • Able to work backwards to find inputs given outputs with complicated patterns • Describes rules for patterns involving exponents and uses them to solve patterns • Is able to “do and undo” a computational procedure by working backwards • Writes an equation or makes a generalized rule for a pattern • Considers all the relationships in a pattern
Patterns and Algebra: Operates on expressions / equations / inequalities	<p>3</p> <ul style="list-style-type: none"> • Demonstrates understanding of the use of variables • Describes and applies the distributive property and combines like terms in solving equations • Solves equations and inequalities with variable and number terms on both sides of the equal sign • Graphs solution sets to inequalities
	<p>2</p> <ul style="list-style-type: none"> • Given the value of variables, correctly evaluates an expression containing those variables • Applies the distributive property and combines like terms in solving equations with partial success • Solves equations with variable and number terms on both sides of the equal sign
	<p>1</p> <ul style="list-style-type: none"> • Given the value of a variable, correctly evaluates an expression • Combines like terms in solving an equation • Solves simple two-step equations
	<p>E</p> <ul style="list-style-type: none"> • Operates on binomials • Solves systems of equations

<p>Patterns and Algebra: Uses algebraic notation to represent and analyze</p>	<p>3</p> <ul style="list-style-type: none"> Given a word problem, represents the situation in algebraic notation, creates a table of data and graphs it Consistently identifies the slope and intercept of a line and explains the significance of each in the relationship, the equation, and the graph
	<p>2</p> <ul style="list-style-type: none"> Given a word problem, represents the situation in a table and graph Identifies the slope and intercept of a line and attempts to explain the significance of each in the relationship, the equation, and the graph
	<p>1</p> <ul style="list-style-type: none"> Given a word problem, represents the situation in a table or graph Attempts to identify the slope and intercept of a line
	<p>E</p> <ul style="list-style-type: none"> Analyzes and interprets patterns and algebraic situations to make predictions and inferences Uses point-slope and slope-intercept form of an equation and can interchange between the two
<p>Open-ended Response: Communicates mathematical reasoning</p>	<p>3</p> <ul style="list-style-type: none"> Analyzes problems, identifies components, and then formulates plan for solving Extends, modifies, or reformulates methods as solution unfolds Can support numeric solutions with graphical representations Uses graphical representations and/or physical objects to solve problems or illustrate solutions Explains solutions to problems using sentences/paragraphs in speaking or writing Makes overt connections with graphical or pictorial representations Uses mathematical terminology appropriate to the situation

	<p>2</p> <ul style="list-style-type: none"> • Uses prescribed processes to solve problems • Can use alternate processes to solve problems following demonstration of such • Graphical representations accompany solutions when required • Describes process of solving problems with simple sentences or bulleted phrases • Sketches of physical objects, simple graphic organizers, or graphs to represent the situation sometimes accompany written responses • Mathematical terminology included in the problem can be included in explanation of solution
	<p>1</p> <ul style="list-style-type: none"> • Uses parts of given processes to begin to solve problems • Names parts of the solution • Tells about problem using some mathematical terms given in the problem • Sketches or graphs are sometimes presented with the solution but are not always clearly linked
	<p>E</p> <ul style="list-style-type: none"> • Designs methods of solving problems based on analysis and application of given theories and knowledge in new situations • Provides counter examples in order to prove solutions • Chooses to use graphical representations and/or physical objects in unorthodox ways to solve problems or illustrate solutions • Convinces others that solutions to problems are plausible and supports his/her thinking by speaking or writing in paragraphs and makes clear and overt connections with graphical or pictorial representations • Communications always contain appropriate and sophisticated mathematical language and notations